

Appl. No. 10/701,335
Amdt. dated December 12, 2007
Reply to O.A. of January 29, 2007

Remarks

Claims 1-18 are pending and at issue in the present application.

As discussed with the examiner during the telephonic interview referenced herein below, amendments have been made to claims 1 and 11 for clarification purposes only and not to change the scope of the claims or to avoid any references.

Claims 11-17 stand rejected as anticipated by Quaid et al. U.S. Publication No. 2004/0106916 (hereinafter, "Quaid") and claims 1-10 stand rejected as obvious in view of Quaid.

No rejection has been issued regarding claim 18, and applicant therefore respectfully requests issuance of a notice of allowance thereof.

The undersigned thanks Examiner Kholdebarin and Examiner Casler for the courtesies extended during a telephonic interview on December 11, 2007, between the examiners, the undersigned, and Thomas Riley. During the interview, the parties discussed the patentability of the application claims in view of Quaid et al. and reached agreement that such claims would be allowable over Quaid et al. The following remarks summarize and amplify the substance of the interview.

For reasons discussed below, the applicant traverses the rejection of claims 1-17 as either anticipated by or obvious over Quaid.

Quaid does not disclose or suggest a system for registering two dimensional image data to intra-operatively digitized landmarks obtained during a joint arthroplasty procedure on a patient, as recited by claims 1-10, that includes means for performing an intra-operative anatomical survey of the joint and an associated limb to digitize selected landmarks and determining a mechanical axis for the limb or means for registering the two dimensional image data to the mechanical axis and displaying a registered image of the mechanical axis and the two dimensional image data on a display.

Further, Quaid does not disclose or suggest a method for registering two dimensional image data to intra-operatively digitized landmarks obtained during a joint arthroplasty procedure on a patient, as recited by claims 11-18, that includes the steps of performing an anatomical survey of the joint and an associated limb, digitizing selected landmarks based on the

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anatomical survey, determining a mechanical axis for the limb based on the digitized landmarks, registering the two dimensional image data to the mechanical axis, and displaying the registered image data and mechanical axis on the display.

It is argued, incorrectly, in the pending final Office action that Quaid discloses determining a mechanical axis for a limb in paragraphs 45 and 54. (Pages 3 and 5). However, paragraph 45 of Quaid describes a robotic arm of a haptic device and has nothing to do with determining the mechanical axis of a limb of a patient. Paragraph 54 of Quaid describes registering patients to a computer-assisted surgery ("CAS") system and to diagnostic data sets of the patient's anatomy using a probe attached to the haptic device and touching the probe to a few selected anatomical landmarks on the patient. However, the registration described in paragraph 54 does not disclose determining a mechanical axis for a limb.

Although in paragraph 113 Quaid does disclose using the haptic device as an input device to define an anatomical axis for the femur bone on a display, the *anatomical axis* disclosed in Quaid is fundamentally different and distinguishable from the *mechanical axis* recited in the claims at issue. Specifically, the anatomical axis of the femur bone is defined by a line running through the center of the medullary cavity of the femur bone. In contrast, the mechanical axis of the femur is defined by a line running through the center of the hip joint to the center of the knee joint. (See 10/701,335 application page 8, lines 11-13). These two axes are offset from one another and provide different anatomical information. For example, an accurate determination of the mechanical axis is especially desirable for proper balancing and alignment of a replacement joint.

Further, paragraph 113 only discloses defining the anatomical axis of the femur by displaying an image of the femur and using the haptic device as an input device to set endpoints of the axis on a display. In contrast, determining a mechanical axis of the femur involves performing an anatomical survey of the actual limb to accurately locate selected landmarks (e.g., the centers of the hip and knee joints). In one method, the center of the hip joint is determined by a nonintrusive initial kinematics assessment of the joint because physical access to the actual center point of the hip joint is blocked by the hip socket. In another method, the center of the knee joint is determined intra-operatively while the knee joint is opened for surgery by digitizing

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the center while a probe is directly touching the knee joint. These determinations cannot be performed by merely setting endpoints on a display as disclosed in paragraph 113 of Quaid. Therefore, paragraph 113 does not disclose or suggest the limitations recited by the claims at issue. In fact, nowhere in Quaid is there any disclosure of determining a mechanical axis, as recited by claims 1-18. Likewise, Quaid does not disclose registering two dimensional image data to the mechanical axis or displaying the registered image on a display, as recited by claims 1-18.

Further, Quaid does not disclose or suggest a kinematic assessment of the joint, as recited by claims 6, 7, 16, and 17. Any assertions in the pending Office action to the contrary are misplaced, as described hereinafter. In fact, Quaid at paragraph 43 merely describes a processor based system for image guided surgery and does not disclose any kinematic assessment. Paragraph 53 actually describes the disadvantages of implementing rigid haptic devices in certain procedures, e.g., where there is "unsensed motion in the kinematic chain connecting the anatomical features of interest." Paragraph 81 discloses inverse kinematics techniques applied to the haptic device, not the joint of a patient.

In addition, regarding claims 3 and 13, Quaid does not disclose or suggest displaying a modified image based on the registered two dimensional image data showing a resection plane of a bone within the joint. The pending Office action asserts that Quaid discloses displaying a resection of a bone in paragraphs 109 and 112. In fact, paragraph 109 actually describes that a haptic object can be used in various procedures, e.g., "for shaping bones in an orthopedic procedure," and paragraph 112 describes using the haptic device as an input device, e.g., "for manipulating the position and/or orientation of bone resections." However, paragraphs 109 and 112 do not disclose or suggest displaying a modified image showing a resection plane, as recited by claims 3 and 13.

For at least these reasons, Quaid does not anticipate or render obvious the claims at issue and all such rejections should be withdrawn.

All of the outstanding rejections having been fully addressed herein, it is believed that all of the pending claims are now in condition for immediate allowance, notice of which is

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requested. If there are any issues remaining that can be resolved by telephone, the examiner is invited to call the undersigned.

Deposit Account Authorization

The Commissioner is hereby authorized to charge any deficiency in any amount enclosed or any additional fees which may be required during the pendency of this application under 37 CFR 1.16 or 1.17, except issue fees, to Deposit Account No. 50-1903.

Respectfully submitted,

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Date: December 12, 2007

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